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HERPETOLOGICA

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A CASE OF POISONING FROM THE BITE OF A BLACK CORAL SNAKE

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The general lack of information concerning poisoning resulting from bites of coral snakes in the United States makes it very desirable to record the details of a most interesting case of this nature which occured last July in Victoria, Texas. Because of the remarkable fact that the coral snake involved was almost entirely black (Plate XII) instead of having the normal coloration (alternating broad transverse bands of black and red, the black bands bordered with narrow rings of yellow) it attracted considerable attention. The snake was taken to the Witte Memorial Museum in San Antonio and through the kindness of the director, Mrs. Ellen Schulz Quillin, was sent alive to me for study.[1] From information kindly supplied by Mr. and Mrs. J. J. Sanders of New Braunfels and Dr. F. B. Shields, the attending physician, of Victoria, I have compiled the following history of the case.

The victim of the bite was Mrs. J. J. Sanders who with her little daughter Laurie Jo was visiting her mother Mrs. O. W. Pfau in Victoria. On the evening of July 15, 1937, the snake was found cross-

[1] In so far as I am aware no decidedly melanistic specimens of *Micrurus fulvius tenere* (Baird and Girard) have been recorded in herpetological literature. This one is entirely black except for a slight trace of the yellow band across the parietals, temporal region and throat. On the ventral surface there is an indication of the first three yellow crossbands of the neck. Since the specimen was preserved these lighter areas have become somewhat more conspicuous than in life. The scutellation is as follows: scale rows 15; ventrals 206; caudals 39; supralabials and oculars ?-? (injured); infralabials 6-7. Total length 650 mm.; tail length 79 mm. Sex male.

ing a street near the northwest limits of the city. The little girl followed it into the grass and put her foot on it. Interested in snakes generally and familiar with coral snakes of the usual coloration, Mrs. Sanders had no hesitancy in picking it up but did not recognize it as a poisonous species. She grasped it just behind the head with thumb and forefinger and carried it in this fashion about two blocks when, as she relaxed pressure for a moment, the snake turned its head to the side and seized the tip of the third finger (fourth digit) of the right hand. Clinging to the side of the finger, the snake bit with a chewing motion and had to be removed forcibly by Mrs. Pfau.

Both fangs had penetrated the skin, one apparently for its entire length and the other only slightly. In less than a minute the entire arm was in pain although no local swelling was evident. The finger was squeezed and oral suction applied. Mrs. Sanders walked two blocks to the home in which she was visiting and held the finger in kerosene while a physician was summoned. Still reluctant to believe that she had been bitten by a venomous snake, she became neither excited nor frightened. This remarkable self-control was doubtless to her advantage.

The physician applied a ligature to the finger and administered one 10 cc. ampoule of antivenin (Nearctic Crotalidae) subcutaneously in the abdomen about forty-five minutes after the bite. No incisions nor mechanical suction were employed. By this time a slight edema had appeared in the finger and extended to the wrist. About fifteen minutes after the above treatment the patient experienced dizziness and nausea, vomiting at intervals for thirty or forty minutes. The physician was unable to state whether serum or "nerves" induced vomiting. The pulse rate increased but the blood pressure was not checked. On the following day the patient's temperature was 100.6. There was no dyspnoea. No supporting treatment was given although codeine and aspirin were prescribed for the relief of pain and temperature and the patient was encouraged to eat plenty of nourshing food and drink large quantities of water and fruit juices. The finger and arm were kept packed in a hot soda solution.

The pain became more intense and continued with little abatement until noon of the following day. In the words of the patient, "All during the night the most unbearable pain seemed to increase and decrease in almost perfect rhythm. The pains seemed to start at the wrist and come out to the end of the finger, growing more and more intense for perhaps thirty seconds, then diminishing gradually

for about fifteen seconds when they would start increasing again, For the first several hours after the bite there was a red streak from the finger to about two inches above the wrist." After the first twelve hours local pain diminished to a dull ache which continued for three days.

During the first twenty-four hours after the bite, the tonsils and throat felt swollen and swallowing was difficult; the glands and muscles of the throat, the whole head and face became painful, especially the jaw bone, teeth and temples. When this passed away, pain in the legs developed, especially in the lower calf and thighs, and lasted for two days.

On the four consecutive days after the bite the temperatures reported by the patient were as follows: 100.4, 100.4, 101.6, 99.6; on the fifth to eighth days it seems to have remained at 99.2. A slight shortness of breath following the least exertion was noticed during the first three or four days. From the fifth to the ninth day, after the pain had entirely ceased, the patient perspired a great deal and was extremely drowsy, scarcely able to keep awake at all. There was no sloughing of the skin or other tissues of the finger. The joints were more or less stiff, however, for two weeks and a feeling of numbness persisted even longer.

It may be adduced from the foregoing that (1) the intense pain immediately following the bite, the swollen feeling in the tonsils and throat, the later development of pains in the head, face, teeth and temples, and the still later pain in the lower legs and thighs are the likely results of the body's reaction to the venom itself; (2) the dizziness and nausea were possibly induced by the serum; and (3) the intense throbbing pain during the first twelve hours was due largely to the pressure caused by the flow of lymph brought to the arm and hand by the hot compress in the absence of incisions for drainage and consequent reduction of pressure. The cause of the excessive sleepiness is not clear. It may have been a delayed reaction to some component of the venom but, considering the fact that it had occured after several days of discomfort and nerve strain, may have been only the expression of a perfectly natural need for rest.

Admittedly without clinical experience in such matters, I do not feel qualified to offer critical comment upon the treatment given in this case, especially since so little is generally known about coral snake poisoning. In conversations, however, with Dr. Dudley Jackson of San Antonio, Texas, and his former associate Mr. W. A. Bevan

(who are probably second to no one in this country in experience with snake poisoning), I have been told that the antivenin now available, although prepared especially for use against the chiefly hemolytic venoms of crotalid snakes (rattlesnakes, copperheads, and the cotton-mouth moccasin) is to some extent helpful against the neurotoxic venoms of coral snakes and therefore can be used to advantage in treating poisoning from their bites. The local use of a hot compress of soda or magnesium sulphate solution forces a flow of lymph into the poisoned area and thus dilutes the venom, retarding its absorption, during which time it can be removed to a considerable extent through incisions in the skin by mechanical suction. If not removed in this way, the resulting swelling and pressure does little but add to the suffering of the patient.

HEMIDACTYLUS NEOTROPICALIS - A CORRECTION

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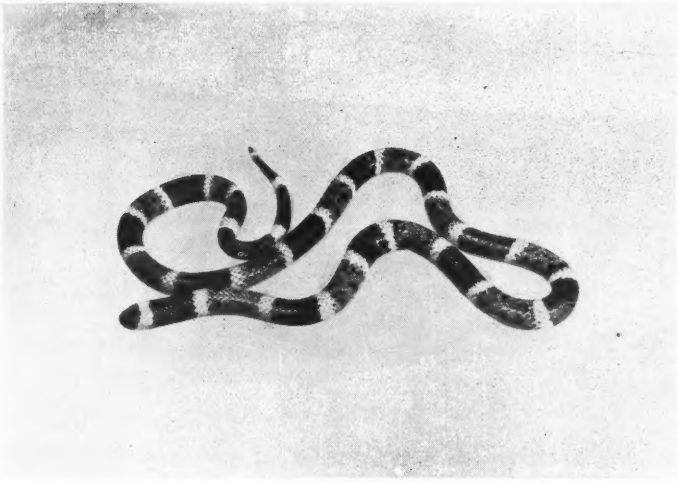
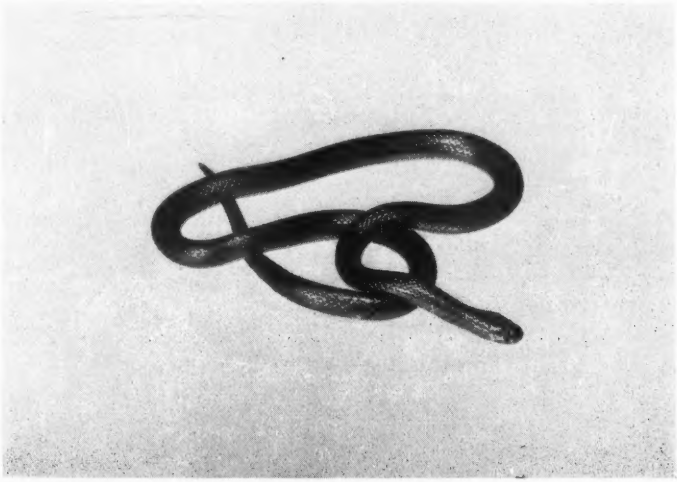
Almost a year ago we had a visit from Mr. R. E. Stadelman, an excellent collector of many reptiles for the Museum of Comparative Zoology. While here he looked at the type of *Hemidactylus neotropicalis* Shreve (Occ. Papers Boston Soc. Nat. Hist., 8, March 31, 1936, p. 270) collected by him. He informed me that he had captured it at Puerto Wilches, Department of Santander, Colombia, no date of capture was given; and he had kept it alive for some time. On its death he dropped it into a tin of material from Curumani, Colombia without labelling it.

Incidentally it is thought that *Hemidactylus neotropicalis* is a synonym of *H. leightoni*, a species overlooked when the original description was made.

PLATE XII



Coral Snake *(Micrurus fulvius tenere)* of normal coloration collected near Jourdanton, Atascosa County, Texas.



Black Coral Snake captured by Mrs. Sanders at Victoria, Texas.

THE STATUS OF *AMPHIUMA TRIDACTYLUM* CUVIER

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Some time ago it came to my attention that many specimens of *Amphiuma* from western Florida were difficult to assign with accuracy to either *means* or *tridactylum*. This led me to begin an investigation with the end in view of determining the correct status of the forms. I have recently had the opportunity of examining over two hundred specimens and have found that, while the two forms are different and have different ranges, where the two ranges meet, intermediates occur.

Originally, both of the forms now known were combined under *means*. Cuvier (1827, p. 7) then described the three-toed form as *tridactylum*. Fitzinger (1843, p. 34), on the basis of the number of toes, erected the genus *Muraenopsis* for the three-toed form. This genus stood until Ryder (1880, pp. 14-15) combined it with *Amphiuma* on the basis of a series from Biloxi, Mississippi. In his paper he demonstrated that the number of digits was of no value as a generic character. Cope (1886, p. 526) relegated *tridactylum* to the synonomy of *means*, and later (1889, p. 218) pointed out his reason for this action, stating that he could not separate the specimens available to him into *means* and *tridactylum*. The two forms remained in synonymy until Brimley (1909, p. 132) became convinced that they were both recognizable and re-elevated *tridactylum* to specific standing. The two have remained as distinct species in the literature up to the present time.

Heretofore the number of toes has been the main character used in distinguishing the two forms. Brimley (1909, p. 132) and Dunn (1918, p. 447) have shown that *tridactylum* is a bicolored form with a sharp line of demarcation between the dark dorsum and the light shade of the ventral side, while *means* is nearly unicolored and is very little lighter on the ventral side than on the dorsum, with no sharp line of demarcation. I have found that the costal groove count and the ratio of total length to body length are also valid characters.

All of the above-mentioned characters change from one type to the other in the region where the two ranges meet. Coloration, costal groove count, and ratio of total length to body length change more or

less gradually, but the two-toed specimens from the east interdigitate with the three-toed specimens of the Mississippi Valley. This is to be expected when characters of this type (presence or absence) are studied, as Dunn (1934, p. 168) points out. Therefore, we sometimes find two- and three-toed forms side by side.

For these reasons I believe the two forms should be given subspecific standing. As *means* is the first available name, it must stand as the specific name, and since from the type locality (evidently Charleston or East Florida) we know it is the name of the eastern form, the western three-toed race must be known as *Amphiuma means tridactylum*.

The two races may be separated as follows:

A. m. means. - A two-toed, unicolored form with 57-60 costal grooves (average 58) and a ratio of total length to body length which averages 1.33.

A. m. tridactylum. - A three-toed, bicolored form with 60-64 costal grooves (average 62) and a ratio of total length to body length which averages 1.29.

It should be pointed out here that *means* from the region about Sebastian, Florida, have a ratio of total length to body length which averages 1.32 and they mature at a smaller size than do typical *means*. Their costal groove count seems to be that of typical *means*.

For the ratio of total length to body length I have taken two separate counts--the first on very young specimens only and a second count which included all available specimens. As approximately the same results were obtained in each case, it is evident that this is a valid racial character.

In the following table the results are given in tabulated form:

	Average Ratio Total Length to Body Length	Extreme Ratios Total Length to Body Length	Aver. No. Costal Grooves	Extreme No Costal Grooves
Typical *tridactylum*	1.29	1.19-1.38	62	60-64
Intergrades	1.32	1.15-1.42	61	58-63
Typical *means*	1.33	1.25-1.41	58	57-60
Sebastian *means*	1.32	1.24-1.37	58	57-60
Young *tridactylum*	1.30	1.19-1.33		
Young intergrades	1.31	1.15-1.40		
Young *means*	1.34	1.27-1.39		
Young Sebastian *means*	1.32	1.24-1.35		

Range. - I find that *m. means* inhabits the Atlantic Coastal Plain from Virginia south throughout peninsular Florida as far west as Liberty Co. The typical western race, *m. tridactylum,* inhabits the alluvial plains of the Mississippi Valley from Louisiana north to Arkansas and Tennessee (Parker; 1937, pp. 61-62). In the region between Lake Pontchartrain in Louisiana and Liberty County, Florida, intergrades may be found between the two forms. Both forms seem to be restricted to areas of low altitude as I know of no valid record of *Amphiuma* above the 500 foot contour line. A specimen in the United States National Museum (No. 10411) has the data, "Ind., Jeffersonville, 1880, Geo. Spangler." As this specimen is certainly not typical *tridactylum* and as it is far out of the range of the genus as known from other specimens, I doubt the validity of the data.

Specimens examined, 206 as follows:

A. m. means. - VIRGINIA: Radium 1, Brunswick Co. 1, Wallacetown 1, Suffolk 1, Camp Lee 1, Virginia Beach 1, Hampton 1; NORTH CAROLINA: Tarboro 1, no data 2; SOUTH CAROLINA: Charleston 2, Hamburg 1, Georgetown Co. 1, Oakley 2, no data 1; GEORGIA: Riceboro 2, Appling Co. 1, no data 1; FLORIDA: Sebastian 23, Brevard Co. 1, Eau Gallie 1, Paradise Key 1, Gulfport 1, Georgiana 1, Arlington 1, Pinecrest 2, Lake Co. 2, Alachua Co. 9.

A. m. tridactylum. - LOUISIANA: vicinity of New Orleans 48, Morgan City 1, Monroe 1, Montpelier 6, Bohon 1, Pineville 1, Ama 19, Pollock 1, St. James Parrish 1, Prairie Mer-Rouge 3, no data 1; MISSISSIPPI: Natchez 2, Chickasaw Co. 1, Greenwood 1; ARKANSAS: Lesterville 1, Jefferson Co. 1, Pulaski Co. 2; ALABAMA: Greensboro 1.

Intergrades - FLORIDA: Pensacola 2, Liberty Co. 1; ALABAMA: Mobile 2, Conecuh Co. 1, Escambia Co. 1; MISSISSIPPI: Biloxi 22, Harrison Co. 1, Columbus 1; LOUISIANA: Covington 13, Mandeville 1.

ACKNOWLEDGMENTS

For the loan of specimens I wish to thank Dr. Doris M. Cochran of the United States National Museum, Mr. Arthur Loveridge of the Museum of Comparative Zoology, Mr. M. Graham Netting of the Carnegie Museum, and Mrs. Helen T. Gaige of the Museum of Zoology, Ann Arbor, Michigan. Mr. Percy Viosca of the Southern Biological Supply Company kindly let me examine the specimens in his care and gave me helpful information about the situation as it exists in

Louisiana. Dr. Thomas Barbour of the Museum of Comparative Zoology assisted me in checking points of nomenclature and Dr. Sherman C. Bishop of the University of Rochester transcribed papers which I did not have. Finally, I wish to thank Dr. A. F. Carr of the Department of Biology, University of Florida, for many helpful suggestions during the course of this study and the preparation of this manuscript.

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NOTES ON THE *PSEUDEMYS SCRIPTA* COMPLEX

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Some time ago I had the opportunity of examining a specimen of a peculiar *Pseudemys* collected in the Rio Grande, Brewster County, Texas, by Mrs. Helen T. Gaige. Although apparently allied to the *scripta* group, the specimen was quite obviously not co-racial with any form known from the United States. Subsequent examination of a number of *P. s. troostii* from the western United States and of *P. ornata* from Mexico and Central America has indicated clearly that the *scripta-troostii* gradient, to which I have recently called attention (1937), continues unbroken through Mexico and Central America in the races of *P. ornata,* and that the Brewster County specimen is near the form described from Mexico as *cataspila* by Gunther (1885). In addition to this specimen (U. M. M. Z. 66472), a pair of dried specimens in the M. C. Z. (nos. 31974 and 31975) collected west of San Antonio in 1851 by the U. S. - Mexican Boundary Commission apparently should also be referred to *cataspila.*

On the basis of skull characters, which are probably the most reliable criteria for subgeneric diagnoses in *Pseudemys, ornata* and its races are unquestionably southwestern representatives of the *scripta* complex. I can find no constant differences between the skulls of Arkansas *troostii* and Panama *ornata.* The racial features of *cataspila* are as follows:

Carapace. - Transverse costal bars of *troostii* reduced to ocellated rounded or elongate dark spots, usually on the postero-ventral corner of each costal plate; a similar spot in the same region of some or all of the upper marginals. The deposits of dark pigment comprising these spots lie in the horny laminae only, while the concentric light or colored area often surrounding them are features of the underlying bony plates. These spots are usually located in the postero-dorsal corners of the plates in *ornata.* A more or less broken dark vertebral line is usually present.

Plastron.--Pattern intermediate between those of *troostii* and *ornata.* The plastral figure of *troostii* is composite, consisting of concentric rings of pigment in the bony layer of each plate, surmounted by diagonal or longitudinal smudges in the laminae; with age the upper layers of pigment obscure the lower and the concentric features disappear. In *scripta* the smudges constitute the entire pattern after the first few months of life. The pattern of *cataspila*

is derived from that of *troostii* by the breaking of the concentric rings and the migrating of the pigmented areas toward the sutures. This process is illustrated by the variants in large series of western *troostii* as well as in the geographic gradient.

Head pattern.—Supratemporal stripe broken to form a conspicuous elliptical spot bordered with black. In typical *ornata* the stripe from the mandibular symphysis is cut off short as a black-bordered lanceolate spot; in *troostii* this spot branches a short distance behind the symphysis and runs posteriorly as a pair of para-median lines. Either condition may be found in *cataspila*, and often the median stripe gives off only one branch.

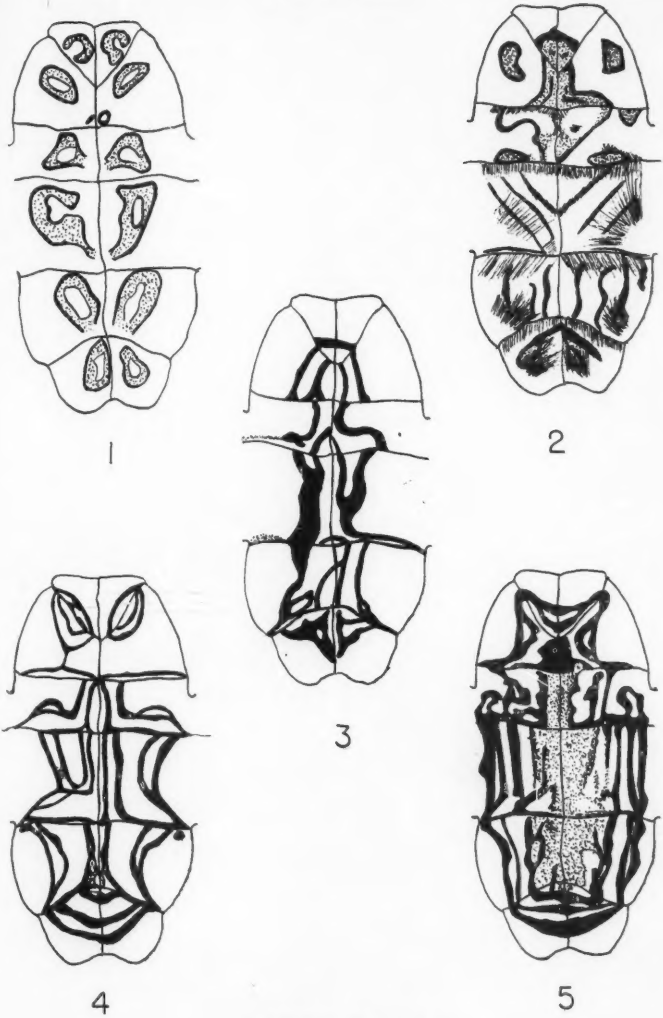
Altho the region of intergradation between *ornata* and *cataspila* cannot be located definitely, it appears to lie approximately in the Tehuantepec area. Intergradation between *troostii* and *cataspila* is noticeable in most Texas specimens. Mr. Coleman Goin informs me that in a series from Black Bayou and Bay City (Victoria Co.), Texas, in the collection of the Carnegie Museum he found intermediates in respect to most of the characters mentioned above.

Of the Mexican *Chrysemys ornata callirostris* (Gray) Boulenger (1889) says, "Differs from the typical form in having the yellow bands on the lips severed into round or oval spots surrounded by concentric black lines. Perhaps only an individual variation." Siebenrock (1909) gives as the range of the race an interrogative "Florida?", but voices no doubt as to its validity. Gray's description of the form (1855) is based on a single specimen, and the characters by which he distinguishes it all fall within the range of individual variation in *cataspila*. I am inclined to agree with Boulenger that Gray's specimen was merely an aberrant *cataspila*.

In regard to the validity, or at least the specific distinctness of *P. grayi* (Bocourt) I am quite doubtful. The skull characters place it in the *scripta* section of *Pseudemys*, and it seems very unlikely that two distinct species of this group inhabit the same, or overlapping, areas. Moreover I have seen no Central American specimen of *Pseudemys* which was not connected in all its characters with *ornata* by intergrades. The characters used to separate *grayi* and *ornata* (size of head, length of snout, length of claws) are sexual rather than specific, and indicate strongly that the descriptions of the two were based respectively on a female and a male of the same species.

In his description of *P. texana*, Baur (1893) states that he considers it the "representative of *Pseudemys* in Texas, Indian Territory,

PLATE XIII



PLASTRAL PATTERNS

1. *Pseudemys s. troostii*, Franklin Co., Kansas. 2. *P. s. cataspila*, "west of San Antonio", 3. *P. s. cataspila*, Tonala, Chiapas, Mexico. 4. *P. s. ornata*, San Pablo, Panama. 5. *P. s. ornata*, Rio Chepo, Panama.

and Northern Mexico". I have recently found the type of *texana* in the collection of the Philadelphia Academy of Sciences (No. 246, San Antonio); it appears to fall in as the western extreme of the *floridana* rassenkreis, and is not to be confused with *cataspila*. Thus, there are two species of the genus in western Texas.

Because of the priority of the name *scripta*, nomenclatural change is indicated for *ornata*, *cataspila*, and *nebulosa*.

Specimens examined.–*P. s. troostii:* Iowa, Burlington, 1; Missouri, Osage River, 2; Kansas, Franklin County, 2; Arkansas, Powhatan, 28, Northwestern Arkansas, 12; Texas, 3, Matagorda County, 1, Mississippi Valley, 2, Dallas, 2. *P. s. cataspila:* Texas, "west of San Antonio", 2, Brewster County, 1; Mexico, Coahuila, San Pedro, 4. Intermediates *(cataspila, ornata)*: Chiapas, Tonala, 11. *P. s. ornata:* Honduras, Tela, 2, Taujica, Sonora Farm, 1; Costa Rica, Caen Dispensary, 3; Canal Zone, Barro Colorado Island, 2; Panama, Rio Chepo, 2, Coble, 6, San Pablo, 1, near Colon, 1.

Acknowledgements.–I am grateful to Dr. Thomas Barbour, whose kindness has made this study possible, and to Dr. Barbour and Mr. Arthur Loveridge for the privilege of examining specimens in the Museum of Comparative Zoology. I am also indebted to Mrs. Helen T. Gaige and Dr. Norman Hartweg, Museum of Zoology, University of Michigan, for the loan of the Texas specimen of *cataspila* mentioned above, to Mr. M. Graham Netting and Mr. Coleman Goin for data on Texas material in the collection of the Carnegie Museum, and to my wife for the drawings of plastral patterns.

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RHYACOTRITON OLYMPICUS (GAIGE) IN NORTHERN OREGON AND SOUTHERN WASHINGTON

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While on a field trip to obtain and see in the living state some of the remarkable new salamanders from Oregon, *Plethopsis wrighti* Bishop, (Herpetologica, 1937:93), Murray Johnson and Howard Richardson secured three specimens of this salamander besides several specimens of *Rhyacotriton olympicus,* three larval *Dicamptodon ensatus* and several *Plethodon vehiculus.* These were all obtained at Alder Creek seven miles above Sandy, Clackamas County, Oregon.

Since the last report on the range of *R. olympicus* at the base of Mount St. Helens (Slater, Copeia 1934:140), I have taken this salamander at the following places in Washington: Yale, Cowlitz County, July 12, 1936; Camp Bonneville, Clark County, July 13, 1936; Tum Tum Mountain in the northeast corner of Clark County, July 17, 1936; at a Falls a few miles east of Stevenson, Skamania County, July 18, 1936; and at a falls one mile east of Oak Point, Cowlitz County, March 21, 1937. This extends the range of the Olympic salamander to another state, Oregon, and adds two counties to its range in this state. All the specimens referred to above have been catalogued and deposited with the herpetological collection at the College of Puget Sound.

Some of the specimens of *R. olymicus* obtained by Johnson and Richardson are different than any I have seen in that they are light brown with small black spots on their lateral and dorsal surfaces and are light cream colored on the ventral surface instead of the customary lemon-yellow. This last is likely a larval character.

The specimens which I obtained at Camp Bonneville were all larvae and measured from 50 to 69 mm. The largest larva I have recorded for any other place is 35 mm.

ON THE SEASONAL OCCURRENCE OF REPTILES IN LUCAS COUNTY, OHIO.

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Few papers have been published on the seasonal occurrence of reptiles in a given area. Klauber (1924, 1926, 1931) summarized his observations on the snakes in San Diego County, California; Brimley (1925) his records for snakes in the vicinity of Raleigh, North Carolina; and Loveridge (1927) his for three species of snakes living near his Massachusetts home. To the best of my knowledge, however, no similar paper has appeared for any middlewestern locality.

During the six years from March 1, 1929 to February 28, 1935, I kept careful record of all reptiles added to the collections of the Toledo (Ohio) Zoological Park. Naturally the greater number originated in the immediate vicinity of Toledo and for the purpose of this paper only records for Lucas County, of which Toledo is the county seat, are included. Specimens were obtained from casual donors, from members of the Toledo Naturalists' Association, and as a result of personal field work.

Statistics based upon material received from such sources do not accurately portray the relative abundance and the seasonal distribution of the various species. All types of habitat were not equally investigated and the larger, more conspicuous forms probably were captured in greater proportion than the smaller, more secretive ones. A large percentage of the material, however, was collected by experienced field workers who were familiar with habitat preferences and who were largely responsible for the acquisition of the rarer specimens. It is believed that the data here presented, though fragmentary and incomplete, give at least some indication of the seasonal distribution of reptiles in Lucas County, Ohio. A summary of the records, save those for lizards, is presented in tabular and graphic form.

Only one species of lizard was found in the county, *Eumeces fasciatus*, the blue-tailed skink, and too few of these were collected to shed much light on seasonal distribution. During the six year period three were taken in May, sixteen in June and fifteen in July, but doubtless they might have been secured in other months if special search had been made for them.

In general the turtles exhibited a comparatively even distribution over the warmer months of the year although *Chelydra serpentina* was noticeably high in July and *Clemmys guttata* in April. *Chry-*

SIX YEAR SUMMARY OF REPTILES OF LUCAS COUNTY, OHIO

SNAKES

SPECIES	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	%	Rank
Coluber c. flaviventris, Blue Racer	1		1	7	9	6	1	1	2				28	2.3	9
Diadophis p. edwardsii, Ring-Necked Snake								1					1	.1	13
Elaphe vulpina, Fox Snake				1	23	10	2	8	2	4			50	4.1	7
Heterodon contortrix, Hog-Nosed Snake				4	10	6	16	7	8	1			52	4.3	6
Lampropeltis t. triangulum, Milk Snake					6	4	5		9	1			25	2.0	10
Natrix kirtlandii, Kirtland's Snake			3	32	13	9	4	4	2	7			74	6.1	5
Natrix septemvittata, Queen Snake				4	6	6	9	3	3				31	2.5	8
Natrix s. sipedon, Water Snake				16	28	13	14	6	2	4			83	6.8	4
Sistrurus c. catenatus Massasauga				1	5	5	2	6	1		1		21	1.7	11
Storeria dekayi, DeKay's Snake	7	2	6	97	18	18	8	4	6	61		3	230	18.8	3
Thamnophis butleri, Butler's Garter Snake	7	1	5	295	4	2	3	2	6	27			352	28.8	1
Thamnophis s. sauritus, Ribbon Snake		1		8	1	2	1			1			14	1.1	12
Thamnophis s. sirtalis, Garter Snake	2	1	15	144	45	13	8	11	3	12	5	2	261	21.4	2
TOTAL	17	5	30	609	168	94	73	53	44	118	6	5	1222	100.0	
% OF TOTAL	1.4	.4	2.5	49.8	13.7	7.7	6.0	4.3	3.6	9.7	.5	.4	100.0		

TURTLES

Amyda spinifera, Spiny Soft-shelled Turtle					1	6	1	5	2	1		1	17	4.4	7
Chelydra serpentina, Snapping Turtle				2	4	16	27	2	1	1	2	1	56	14.5	3
Chrysemys b. marginata, Painted Turtle	1	13	3	13	23	25	24	27	4	1		1	135	34.9	1
Clemmys guttata, Spotted Turtle		1	1	12	7	5	1		2				29	7.5	5
Emys blandingii, Blanding's Turtle	1			13	7	11	7	6	3	1			49	12.7	4
Graptemys geographica, Map Turtle				3	2	4	3	8	2				22	5.7	6
Sternotherus odoratus, Musk Turtle				1			4	1	2	1			9	2.3	8
Terrapene carolina, Box Turtle					11	24	20	7	5	3			70	18.1	2
TOTAL	2	14	4	44	55	91	87	56	21	8	2	3	387	100.0	
% OF TOTAL	.5	3.6	1.0	11.4	14.2	23.5	22.5	14.5	5.4	2.1	.5	.8	100.0		

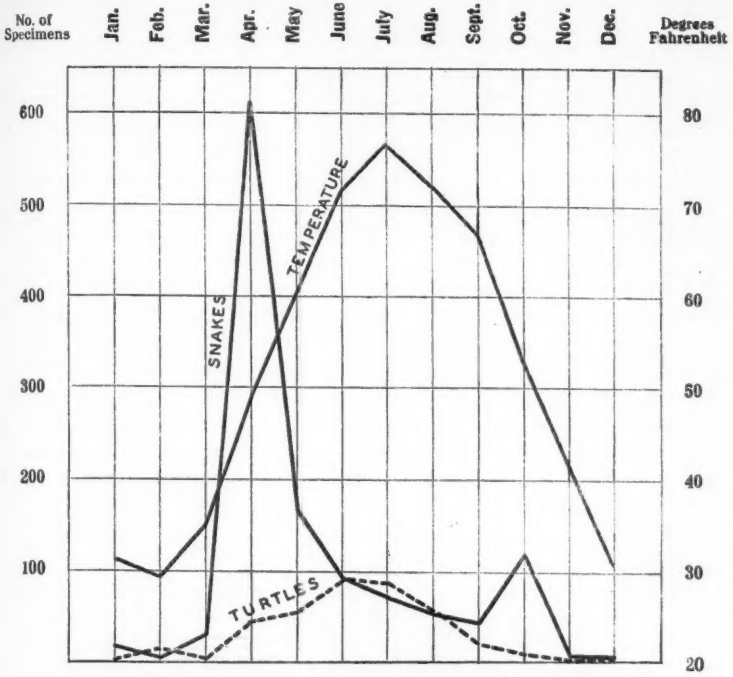

Fig. 1. Distribution of Lucas County Snakes and Turtles by Months. Also Average Mean Monthly Temperature Curve from March, 1929 to February, 1935 (as recorded at the Toledo Weather Bureau).

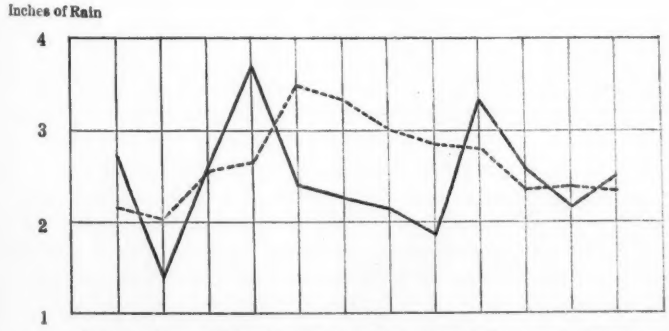

Fig. 2. Normal Monthly Precipitation (dotted line) and Average Monthly Precipitation from March, 1929 to February, 1935 (solid line). Statistics from the Toledo Weather Bureau.

semys bellii marginata was taken in every month except November. The peak of abundance of the turtles coincided, more or less, with the egg laying season. This reflects the ease with which they may be captured on land, as compared with their elusiveness in water.

With the snakes the abundance of spring records when compared with those of other seasons stands out at once. This probably is the result of many contributing factors, among which are the tendency of the snakes to bask in the sun after the hibernating period, the activities stimulated by the mating instinct and the lack of cover such as is afforded by vegetation later in the year. The human element also must be considered, for collectors usually are most active in spring and during daylight hours. Since many of the snakes become partially, or even wholly, nocturnal in hot weather, they are less apt to be seen in summer than in spring or fall. Fall records for snakes were also more numerous than summer records. Possible reasons for this are mentioned below.

It is noteworthy that casual donors presented more specimens during the summer months (possibly because of the greater number of vacations at that time of year) than in any others, but the great bulk of spring and fall records came from a certain few collectors who were in the field practically every week-end from March to November.

A brief resume of the records is of interest. *Heterodon contortrix, Natrix septemvittata* and *Sistrurus c. catenatus* showed little seasonal fluctuation. The high point in September for *Lampropeltis t. triangulum* was due, in part, to the appearance of newly hatched young during that month. The single record for *Diadophis p. edwardsii* cannot be attributed to an accidental occurrence, for two or three other specimens were found in the same locality prior to 1929.

The smaller snakes, such as *Natrix kirtlandii, Storeria dekayi* and the three species of *Thamnophis,* showed a peak of abundance in April, while the larger *Coluber c. flaviventris, Elaphe vulpina* and *Natrix s. sipedon* were most numerous in May. From this, one might assume that size is an important factor in the emergence of snakes in spring, and that the smaller species as a whole leave hibernation and become active some weeks earlier than the larger ones. While size probably is a factor, it should be noted that the five small snakes showing an April peak are all members of the subfamily Natricinae. In contrast, a study of the statewide records of Ohio reptiles accumulated during the same six year period shows that the common small *Diadophis p. edwardsii* and *Carphophis a. helenae*

of the subfamily Xenodontinae had a decided peak of abundance in May instead of in April. This contrast is of even greater interest when one considers that *Carphophis* occurs in Ohio only in the southern counties and *Diadophis* appears to be somewhat more common in that part of the state than in any other. The spring season is more advanced in southern Ohio than in Lucas County, and, if size alone were the most important factor, one would expect these species to appear in numbers even earlier than the smaller Lucas County snakes. The graph (Fig. 1) shows a minor peak for the snakes during October and here again it is the small Natricine species which are largely responsible.

Of all the snakes *Thamnophis butleri* exhibited the most remarkable seasonal distribution. It was not only the most abundant reptile, but 84% of those collected were taken in April. It first appeared in numbers during the first week in April in each of the six years. *Thamnophis s. sirtalis* was the only species obtained in every one of the twelve months.

Meteorological statistics clearly illustrate that the rainfall was quite abnormal during the six year period under consideration. By comparing the average monthly precipitation (as recorded at the Toledo Weather Bureau) for the past six years with the normal, some significant departures are at once evident (Fig. 2). The average amount of rain in April was unusually high and might appear correlated with the large number of snake records for the same month. The high average precipitation however, was considerably influenced by two very rainy Aprils, one in 1934 with 5.31 inches of rainfall, and one in 1929 with 7.13 inches. The latter was the rainiest month in the six years, and also the rainiest April in the history of the Toledo Weather Bureau. As further evidence that the abundance of rainfall was not in direct proportion to the number of snakes obtained, is the fact that actually fewer were collected during the two rainy Aprils than in other years. This, however, may reflect the tendency of the collector to remain indoors during inclement weather,

The precipitation from May to August inclusive was considerably below normal. This lack of moisture undoubtedly resulted in causing large numbers of snakes to retire to places inaccessible to the collector. It probably had the opposite effect on turtles and the more aquatic snakes, since the smaller ponds and streams shrank in size and concentrated the reptiles in small areas. Here numbers of them were collected with less effort than normally.

The rise in amount of rainfall again in September to almost the high mark of April doubtlessly caused many snakes to return to the surface of the ground from subterranean hiding places. The minor peak of abundance in October probably was influenced to some extent by early fall rains.

The average mean monthly temperatures during the six years closely approximated the normal. It is interesting to note that the number of snake records increased until the average mean temperature passed 50 degrees F. (in April) when there was a sharp decrease. The secondary peak of snake abundance in October occurred at the same time average mean temperatures decreased to almost 50 degrees Fahrenheit.

A comparison of the present records for snakes with those of Brimley (1925) and Klauber (1931) reveals several items of interest. Brimley tabulates his records in four groups, garter and water snakes *(Thamnophis* and *Natrix),* small burrowing and ground snakes *(Storeria, Virginia, Diadophis,* etc.), terrestrial snakes *(Elaphe, Coluber, Lampropeltis, Heterodon,* etc.), and the pit viper *(Agkistrodon).* In the first two groups April is the high month, in the third group May is high, and in the fourth the distribution is fairly even during the summer. In all these groups the peaks and the records in general are strikingly similar to those of the same or related forms noted from Lucas County, Ohio.

Klauber's statistics show that only three species of snakes, of a total of twenty-nine, had a peak in April; two of these are the rattlesnakes *Crotalus cerastes* and *C. ruber,* and the third is the small *Hypsiglena ochrorhynchus* which was only slightly more abundant in April than in other months. His remaining species were most numerous in May and June except those of which too few individuals were collected to yield significant data. It is of importance, however, that both May and June were considerably ahead of April in total number of specimens taken.

Unfortunately, Loveridge's observations do not cover a complete year and a detailed comparison of his records with the others cannot be made.

From the above it is apparent that the records from Raleigh and Toledo are in closer agreement with each other than either set is with those from San Diego. The fact that the snakes in the two eastern (and more northern) localities apparently emerged from hibernation at an earlier date than those in southern California is difficult to ex-

plain. This is especially true when the lack of data from other and more intermediate localities is considered. Several things, however, might be suggested as being at least partially responsible for this seemingly paradoxical situation.

The more pronounced changes of temperature prevalent in the two eastern localities may act as more powerful stimuli to hibernating snakes and tend to bring them out in such numbers, and in such a short period as to make them especially conspicuous.

Another possible factor is the association of large numbers of snakes in specific "denning" areas. *Thamnophis butleri* is a case in point. In a small portion of Bayview Park, Toledo, this species apparently hibernated in considerable numbers, and a very large percentage of the total number of specimens taken was collected there during the first few warm days of spring. While records for the other Lucas County snakes are not so concentrated in one place, other "denning" areas of *Thamnophis s. sirtalis, Storeria dekayi* and *Natrix kirtlandii* were noted. Active collecting in several such localities at the optimum time in spring undoubtedly influenced the records to a considerable extent.

The extremely varied topographic and climatic conditions obtaining in San Diego County, California, as compared with Lucas County, Ohio, or Raleigh, North Carolina, suggest at once the difficulties of making comparisons. Klauber (1931) has shown that the distribution of snakes in his area is greatly affected by altitude, rainfall, temperature and amount of vegetation. While several types of habitats exist in Lucas County, and doubtless near Raleigh, both of the latter areas certainly fail to exhibit anything approaching the great variety of environmental conditions existent in San Diego County.

In the face of the appalling lack of data it is perhaps futile to compare seasonal records from different parts of the country. Information on seasonal distribution, particularly information which is correlated with meteorological and altitudinal data, is badly needed from a large number of localities.

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TYPHLOPS BRAMINUS IN MEXICO

BENJAMIN SHREVE

Museum of Comparative Zoology

Through the generosity of Dr. Thomas Barbour, the Museum of Comparative Zoology has received at various times collections made by W. W. Brown in Guerrero, Mexico. Contained in these collections are four *Typhlops braminus* from Chilpancingo, two (Mus. Comp. Zool. Nos. 33602-3) collected between January and June 1932, and the others on May 15, 1937. I cannot see that these four specimens are in any way different from Indian *braminus*. This, insofor as I know, is the first New World record for *Typhlops braminus*; although its occurence might well be expected there in view of the fact that this species has apparently been accidentally introduced into many places in the Old World.